(54) Teaching toy telephone

(57) An educational toy telephone (100) is provided and includes a telephone base (104) and a removable handset (102). A numerical keypad is provided by which an input telephone number may be entered into said telephone. The telephone further includes a microprocessor (164) and memory associated therewith for controlling the various functions of the toy telephone and storing a user-defined programmed telephone number. A message controller (168) is provided, responsive to an output signal from the microprocessor (104). The message controller (168) stores at least one pre-recorded message consisting of at least one of individual tones, patterns of tones, and a voice message. The microprocessor (164) compares telephone numbers entered into the keypad (130) against the predefined telephone numbers. The voice controller (168), responsive to the microprocessor, audibly reproduces the at least one pre-recorded message when the comparison performed by the microprocessor determines that the input telephone number matches the predefined telephone number.
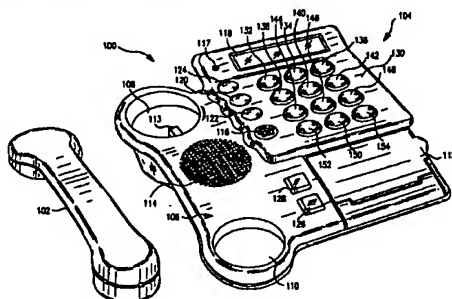
FIG. I

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Description

[0001]　The present invention relates to toy telephones for use by children. Such toys are well known in the art and many examples may be found in toy stores. Most models include a base and a removable handset connected to the base by a cord or segment of rope. A number of buttons are generally located on the face of the telephone and a child playing with the telephone may press the various buttons while pretending to use the telephone. The base may also include a cradle for receiving the handset when the phone is not in use, mimicking an actual telephone when the receiver is "on the hook". The cradle may further include a switch which is actuated when the handset is placed in or removed from the cradle.

[0002]　In some cases, a toy telephone will produce sounds such as individual musical notes, simple melodies, or even animal sounds, in response to a child pressing the various buttons on the telephone. Furthermore, the switch in the cradle may disable the buttons and sounds when the handset is placed in the cradle, or the cradle switch may cause alternate noises to be sounded when the child presses the buttons with the handset in the cradle. Brief phrases such as "Hello Let's Play!" may be repeated when the toy is turned on, or when the handset is removed from the cradle.

[0003]　In general, prior art toy phones are just that, toys. They serve no other purpose than to occupy and entertain a child. There is no close correlation between the manner of playing with the toy telephone and the manner of using a real telephone. Thus, the typical toy telephone according the present state of the art does little to educate a child in how to use a telephone.

[0004]　It is prudent to teach children the rudimentary aspects of using a telephone at an early age not only for educational purposes, but also for safety reasons. News stories abound wherein a child calls 911 in response to a domestic emergency and a family tragedy is averted thanks to the child's knowledge of how to call for emergency assistance. It is also important for children to learn their own telephone number, or that of a relative, at as early an age as possible so that parents or relatives can be contacted in case a problem occurs while the child is away from the home. Unfortunately, toy telephones according to the present state of the toy telephone art do not address these concerns.

[0005]　Because play serves an important role in child development and learning, a toy telephone represents the ideal platform for educating children how to use a telephone. It would be desirable to introduce through a toy telephone fundamental telephone skills such as dialing 911 or a child's home telephone number, as well as to familiarize a child with other telephone concepts such as dial tone, the busy signal, and a ringing telephone. To achieve these early educational goals, a toy telephone that mimics the operation of a real telephone is required. Such an educational tele-

phone should include a standard numbered keypad similar to that found on most phones and should operate on similar principles. For example, the keypad should be functional only when the handset is removed from the cradle and the phone should be responsive when proper emergency numbers and/or a child's home telephone number is entered. An appropriate positive response from the telephone when these various important numbers are correctly entered into the keypad will help to ingrain these numbers in the child's memory and will enhance the child's enjoyment of the toy. Further, if the numbers entered into the keypad are displayed as they are entered, a child will learn to associate the pressing of a particular button with a certain positive result. As the child's skill in using a telephone increases, the child will soon associate entire strings of numbers entered into the keypad as complete telephone numbers viewed on the display.

[0006]　In light of the background given above, a primary object of the present invention is to provide a toy telephone adapted to teach children the rudimentary aspects of using a telephone.

[0007]　Another other object of the invention is to provide an educational toy telephone, which teaches a child to dial 911 in the event of an emergency.

[0008]　A further object of the invention is to provide an educational toy telephone which teaches a child how to reach an operator.

[0009]　A still further object of the invention is to provide an educational toy telephone which facilitates teaching a child his or her own home telephone number.

[0010]　Yet another object of the present invention is to provide a toy telephone which teaches basic aspects of telephone usage in an engaging and entertaining manner so as to hold the attention of an easily distracted child.

[0011]　All of these objects, as well as others which will become apparent upon reading the detailed description of the preferred embodiment of the invention, are met by the teaching telephone disclosed herein.

[0012]　The teaching telephone of the present invention includes a base unit and a removable handset. The base unit includes a cradle for receiving the handset. A switch located within the cradle provides indication whether the handset has or has not been removed from the base. The base further includes a numeric keypad similar to that found on most standard telephones. The keypad includes a plurality of pushbutton switches including buttons designated 0 through 9 as well as symbols "#" and "*" . Additional buttons located on the face of the toy telephone base include two "Speed Dial" buttons, a program button, a record button, and a power on/off button. A liquid crystal display is also located on the base of the toy telephone along with a speaker and a microphone.

[0013]　The pushbuttons on the face of the toy telephone and the cradle switch are all connected as inputs

to a microprocessor located on a printed circuit board mounted within the base. In addition to receiving the pushbutton inputs, the microprocessor drives the liquid crystal display and interfaces with other components, which record, store, and play back audio messages. In the preferred embodiment of the invention these additional components comprise a message recorder and a separate message controller.

[0014]   The microprocessor receives input data in the form of both sequential and contemporaneous pushbutton entries manually entered on the keypad and other buttons located on the faceplate. In response to this input data, the microprocessor generates output signals which control the display and the voice controller. In the preferred embodiment, the microprocessor controls the message recorder indirectly through the voice controller, however, alternate embodiments are possible wherein the microprocessor controls the message recorder directly, or indirectly through a circuit component other than the message controller.

[0015]   The control signals generated by the microprocessor in response to various input sequences initiate various operating functions of the toy telephone. Among the functions performed by the teaching telephone of the preferred embodiment are the recording of a personalized message, and the programming of a user's telephone number. These functions allow a parent or supervisory adult to program a child's home telephone number into the toy telephone and record a greeting or congratulatory message to be played back when the child correctly enters the programmed number. Thus, the toy telephone will help a child learn the programmed telephone number by providing positive reinforcement whenever the correct number is entered into the keypad. Thus, when a child dials her home telephone number to talk to her mother or father, the teaching telephone can be configured to answer in the voice of the child's mother or father voice, thereby providing strong positive reinforcement that the child is using the telephone correctly. Later the telephone can be re-configured to teach other telephone numbers such as the child's grandmother's telephone number. Again, if the child correctly enters Grandmother's telephone number, and the telephone responds in Grandmother's voice, a strong association will be formed in the child's mind between Grandmother's telephone number and speaking with Grandmother over the telephone.

[0016]   As an additional reinforcing tool, the numbers entered into the keypad are displayed on the liquid crystal display as they are entered. Thus, the child can visualize the proper sequence of digits as they are entered into the toy telephone. A compartment is also provided wherein important numbers may be written and stored. Thus, a child may compare the numbers displayed on the telephone against those written and stored in the compartment to ensure that numbers are entered correctly.

[0017]   Additional functions, messages, and meaningful input pushbutton sequences may be pre-programmed permanently into the teaching telephone. For example, a teaching toy telephone may be provided wherein pressing the "0" button will cause a pre-recorded operator message to be played, or wherein entering "911" may elicit an appropriate emergency response in order to teach a child how to call for emergency assistance. Any number of alternate input combinations or messages may also be provided, such as emergency assistance number employed in foreign countries.

[0018]   Other, more entertaining functions, may also be provided to help maintain a child's interest in the toy telephone. For example, various messages or tones or combinations thereof may be played in response the pressing the "*" and "#" buttons. Also, the telephone can be configured such that the "Speed Dial" buttons will cause random pre-recorded fun messages to be played indicating to a child that the telephone may be used to contact many different locations, such as friends, the library and so forth. Thus, the toy telephone of the present invention facilitates a child's memorization of important telephone numbers while helping to teach the child important skills as to the operation and use of a telephone in a fun and engaging manner.

Fig. 1 is a perspective view of a teaching toy telephone according to the preferred embodiment of the invention:
Fig. 2 is a functional block diagram of the preferred embodiment of the teaching toy telephone of the present invention; and
Fig. 3 is a simplified electrical schematic diagram of the preferred embodiment of the reaching toy telephone of the present invention.

[0019]   Referring to Fig. 1 a teaching toy telephone according to the preferred embodiment of the invention is shown at 100. The toy telephone includes a removable handset 102 and a base 104. The base includes a cradle 106 formed of an upper recessed area 108 and a lower recessed area 110. Upper and lower recessed areas 108, 110 are positioned to receive mating portions of the handset 102 when it is placed in the cradle 106 and when toy telephone 100 is not in use. A cradle switch 112 (see fig. 3) includes an actuator 113, which protrudes into upper recessed area 108. Handset 102 engages actuator 113 when the handset is placed in cradle 106 such that switch 112 provides indication whether handset 102 has been placed in cradle 106.

[0020]   Base 104 further includes a speaker 114, a microphone 116, an LED 117, a liquid crystal display (LCD) 118, a paper compartment 115 to store important telephone numbers in writing, and a plurality of input buttons. Input buttons include Speed Dial buttons 120, 122, On/Off button 124, Program button 126. Record button 128, and a standard twelve button telephone key-

pad 130. Keypad 130 comprises discrete input buttons representing digits 1-9, "0", "*", and "#" identified by reference numbers 132-154 respectively.

[0021]   In operation telephone 100 is turned on and off by alternately pressing the On/Off button 124. When telephone 100 is turned on LED 117 is illuminated. If the telephone is left idle for more than ten seconds, meaning that none of the input pushbuttons change state during such ten second period, the telephone will automatically turn itself off, removing power to the telephone's electronic circuitry, and extinguishing LED 117.

[0022]   When telephone 100 is turned on and handset 102 is removed from cradle 106, a dial cone is played over speaker 114. Again, if the telephone is left idle for more than ten seconds, the telephone will automatically shut itself off.

[0023]   The remaining functions of toy telephone 100 all must occur with handset 102 removed from cradle 106, just as the handset of an actual telephone must be removed from its cradle prior to placing a call.

[0024]   When Speed Dial A button 120 is pressed while the dial tone is sounding, a seven tone pattern mimicking the touch-tone pattern of a real telephone is played over speaker 114. The seven tone pattern is followed by two ringing tones, followed by a message randomly selected from a first group of three pre-recorded speed dial messages.

[0025]   When Speed Dial B button 122 is pressed while the dial tone is sounding, a seven tone pattern is sounded, followed by two ringing tones, followed by a message randomly selected from a second group of three pre-recorded speed dial messages.

[0026]   When the "0" button 150 is pressed while the dial tone is sounding, the number "0" will be displayed on display 118. If no other button is pressed within three seconds following the pressing of the "0" button 150, two ringing tones will sound, followed by a pre-recorded operator message.

[0027]   When the "*" button 152 is pressed while the dial tone is sounding, two ringing tones will sound over speaker 114.

[0028]   When the "#" 154 button is pressed while the dial tone is sounding, a telephone number programmed into the telephone by a parent or other supervising adult will be displayed on display 118. (The procedure for programming a telephone number is described below). Simultaneously, a busy signal will be sounded over the speaker 114.

[0029]   Finally, telephone numbers may be entered by sequentially pressing the buttons 132-150 corresponding to each digit of the telephone number being entered .As each button is pressed a key tone sounds over speaker 114 and the depressed digits comprising the telephone number are displayed on display 118. If an incorrect number is entered, the handset 102 may be replaced in cradle 106 or the cradle switch actuator 113 may be manipulated manually to clear display 118 and reset the telephone. When handset 102 is again

removed from cradle 106 or the cradle switch actuator released, the dial tone sounds again, and another number may be entered. When the number "911" is entered, an emergency message is played. When a programmed telephone number is entered, a pre-recorded personalized greeting or congratulatory message recorded by a parent or supervising adult is played over speaker 114. (The procedure for recording the personalized message is described below.)

[0030]   As noted above, an adult may program a child's home telephone number, or some other telephone number having significance to the child, into the telephone. The program mode is entered by pressing and holding down the program button 126 concurrently with pressing and releasing the "#" button 154. Once in program mode, the adult user may enter a series of digits by pressing the appropriate numbered buttons 132-150 corresponding to the telephone number to be programmed. In the preferred embodiment of the invention, the programmed number may not exceed eleven digits. Upon entering the entire number, the program button may be released, whereupon the telephone exits the program mode. Once entered, the programmed number may be verified by pressing the "#" button 154, causing the programmed number to be displayed on display 118. If an error entering the number has occurred, the error may be corrected by re-programming the number.

[0031]   For recording a personalized message to be played when the programmed number is correctly entered into keypad 130, both the Program button 126 and the Record button 128 must be pressed and held down simultaneously. After a three second pause, a tone is sounded over speaker 114 and recording begins. Upon hearing the tone, the user recording the message may begin speaking into microphone 116. The recorded message may be up to twelve seconds long. However, recording will stop as soon as either the record button 128 or the program button 126 is released so that the recorded message may be less than twelve seconds long.

[0032]   Turning to Fig. 2, a functional block diagram of the preferred embodiment of the reaching toy telephone of the present invention is shown at 160. Functionally, the telephone comprises a plurality of inputs 162, a central processing unit (CPU) 164, display 118, a message controller 168, a message recorder 170, speaker 114, and microphone 116.

[0033]   Inputs 162 comprise the pushbutton switches 120-154 located on the face of telephone 104 and described in reference to FIG. 1, as well as switch 112 actuated by cradle switch actuator 113. Inputs 162 are operatively connected to CPU 164 as indicated by connection 176.

[0034]   The CPU 164 drives display 118 and message controller 168 in response to input data received from inputs 162. The operative connections between CPU 164, display 118 and message controller 168 are shown as connections 178 and 180 respectively. CPU

164 also acts to record and store the user programmed telephone number. In the preferred embodiment, CPU 164 does not control message recorder 170 directly, but rather CPU 164 controls message recorder 170 indirectly through message controller 168 as evidenced by connections 180 and 182. However, those skilled in the art will recognize that CPU 164 may be readily configured to control message recorder 170 directly as shown by alternate dashed connection 187. Further, it is also possible that the functions performed by the message controller and message recorder may be combined into a single component with which CPU 164 interfaces directly, or these functions may be included within CPU 164 itself.

[0035]   The interaction between CPU 164 and display 118 is such that as numbers are entered on the push button keypad 130 located on the face of the toy telephone (see Fig. 1), the corresponding numbers are displayed on display 118.

[0036]   Message controller 168 stores pre-recorded messages, and on command from CPU 164, plays select messages back over speaker 114. The messages stored by message controller 168 may comprise any combination of tones, patterns of tones, or voice messages. For example a message may comprise a single tone such as a busy signal, a series of tones such as a number of telephone rings, or a combination such as a random pattern of tones representing different keys being pressed on keypad 130 (see Fig. 1) followed by a series of rings, followed by a voice message. In operation. CPU 164 determines which message, if any, is to be played back by message controller 168 and sends the appropriate signal to the message controller commanding message controller 168 to reproduce the selected message. Upon receiving the signal from CPU 164, message controller 168 sends an audio signal over connection 184, which is broadcast by speaker 114.

[0037]   In addition to storing and playing back prerecorded messages, message controller 168 also controls message recorder 170. Again, in response to a control signal from CPU 164, message controller 168 commands message recorder to either record a new message, play back a saved message, or erase the message presently stored in the message recorder. The commands to message recorder 170 are shown as connection 182. When recording a new message, message recorder 170 receives a signal from microphone 116 via connection 186, and stores the signal in its own internal memory. When playing back the message, message recorder 170 retrieves the signal and outputs the signal to speaker 114 over connection 184.

[0038]   Turning now to Fig. 3, a schematic diagram of a toy telephone implementing the functional block diagram of Fig. 2 is shown at 200. Like components previously described with reference to Figs. 1 and 2 have been given identical reference numbers in Fig 3. Therefore, inputs 162 include on/off button 124, cradle switch 112, record button 128, program button 126, Speed Dial buttons A and B 120, 122, and keypad buttons 132-154. In the preferred embodiment CPU 164 comprises a microprocessor manufactured by Sonix Corp. part no. SN69040M. As shown, inputs 162 are multiplexed onto four discrete inputs P20, P21, P22, and P23 of CPU 164. CPU outputs (insert S1-S32 and C1-C4) drive LCD display 118, and outputs P 4/0, P 4/1, P 4/2, and P 4/3 comprise the CPU 164 output signal 188 driving message controller 168. Output signal 188 comprises a parallel four bit signal input to message controller 168.

[0039]   In the preferred embodiment, message controller 168 comprises a sound synthesis chip manufactured by Sonix Corp. part no. SN67060. Message controller 168 includes an integral memory in which a plurality of digitally coded messages may be stored. In the toy telephone of the present invention, the messages stored in message controller 168 include a dial tone, an alarm tone, a ringing telephone tone, a busy signal, a touch tone button sound, six pre-recorded speed dial messages, an operator message and an emergency message. These messages may be recorded and permanently stored in voice controller 168 at the manufacturing facility prior to shipping the final product. Message controller 168 further includes an internal digital/analog ("D/A") converter coupled to analog output VO, which in turn is coupled to speaker 114.

[0040]   The individual messages stored in voice controller 168 are selected for playback by CPU output signal 188. Signal 188 comprises a four-bit word input to voice controller 168. Thus, CPU 164 can send up to sixteen commands to voice controller 168. Message controller 168 is configured such that each of the sixteen commands, received via signal 188, will initiate a different function within the message controller For example, message controller 168 may be configured such that signal 188 transmitting the binary combination 0001 may trigger the message controller to play back a dial tone. Similarly, the message controller may be configured such that the combination 0101 will trigger message controller 168 to playback one of the pre-recorded speed dial messages, and so forth. The preceding examples should be viewed as examples only, and should not be construed as limiting the invention in any way. The message controller may be configured such that any input combination from signal 188 may trigger any desired response. However, each pre-recorded message stored in message controller 168 will have a unique CPU output command associated therewith such that each message will be played back over analog output VO to speaker 114 in response to the proper command from CPU 164.

[0041]   In addition to playing back pre-recorded messages, message controller 168 also controls message recorder 170. In the preferred embodiment of the invention, voice recorder 170 comprises a single integrated speech recorder manufactured by Utron Technology, Inc., part no. UT53108. Message recorder 170 includes an internal microphone amplifier, D/A con-

verter and static SRAM. Message recorder **170** is provided to record and play back the personalized message which is to be sounded when a child playing with toy telephone **100** correctly enters the programmed telephone number. Inputs and outputs to message recorder **170** include an analog microphone input, an analog audio output, and binary inputs Record, Play, and Erase.

[0042] Message controller **168** controls message recorder **170** via the three binary inputs Record, Play, and Erase. As would be expected, when the message controller sets the Record input high, voice recorder **170** records the analog signal supplied by microphone **116**. As the user enunciates the personalized message, an A/D converter converts the analog microphone voice signal to a digital signal which is stored in the message recorder's SRAM memory. Similarly, when message controller **168** sets the Play signal high, die digital message stored in the message recorder's SRAM memory is converted back to an analog signal and output via the voice recorder's analog output AUD for broadcast over speaker **114**.

[0043] Both voice controller **168** and voice recorder **170** output audio signals are connected to speaker **114**. Therefore, diodes **190, 192** are placed in the analog output circuits of both voice controller **168** and voice recorder **170** in order to prevent each output circuit from reverse feeding the other. A 5K volume control potentiometer **194** is provided in the speaker output circuit, as is output amplifier **196**.

[0044] Other miscellaneous circuit features shown in Fig. 3 include a 4.5v battery power source **198** and various biasing resistors and filtering capacitors associated with voice recorder **170** and microphone **114**. Power-on indicating LED **117** is connected between the positive supply voltage Vcc and pin P3.3 of message controller **168**. Thus, LED **117** draws current and is illuminated when Vcc is present and message controller **168** is powered up. The electronic components and circuitry shown in Fig. 3 are mounted on a printed circuit board (not shown) housed within the base **104** of toy telephone **100**.

[0045] It should be noted that various changes and modifications to the present invention may be made by those of ordinary skill in the art without departing from the spirit and scope of the present invention, which is set out in more particular detail in the appended claims. Furthermore, those of ordinary skill in the art will appreciate that the foregoing description is by way of example only, and is not intended to be limiting of the invention as described in such appended claims.

Claims

1. A toy telephone adapted to teach children how to operate a real telephone and to facilitate memorization of important telephone numbers, the toy telephone comprising:

    a keypad including a plurality of switches;
    a message recorder;
    a message controller;
    a speaker;
    a microphone; and
    a microprocessor;
    said keypad switches connected as inputs to said microprocessor;
    said microprocessor configured to receive input data in the form of both sequential and contemporaneous entries manually entered trough said keypad switches, said microprocessor further configured to generate one of a plurality of output control signals each associated with a predefined sequence of pushbutton entries, said output control signal operatively connected to at least one of said message controller and said voice recorder, such that in response to various said pre-defined pushbutton sequences entered through keypad switches, voice messages are recorded and pre-recorded messages are selectively reproduced over said speaker.

2. The toy telephone of claim 1 further comprising a base and a removable handset, said base forming a cradle for receiving said handset, and wherein a switch actuable by said handset is located within said cradle and is further connected as an input to the microprocessor.

3. The toy telephone of claim 1 wherein said keypad switches are discrete pushbuttons each bearing a unique indicium.

4. The toy telephone of claim 1 wherein said message controller controls a plurality of pre-recorded stored messages, said message controller being configured to selectively cause the reproduction of individual pre-recorded messages in response to predefined control signals from said microprocessor.

5. The toy telephone of claim 1 wherein said pre-recorded messages comprise at least one of tones, patterns of tones, and voice messages.

6. The toy telephone of claim 5 further comprising a first speed dial button, and wherein said pre-recorded stored messages further comprise a first plurality of speed dial messages, and wherein said microprocessor randomly generates a play message command associated with one of said first plurality of speed dial messages, and said message controller reproduces one of said first plurality of speed dial messages in response to said play message command.

7. The toy telephone of claim 6 further comprising a

second speed dial button, and wherein said pre-recorded stored messages further comprise a second plurality of speed dial messages, and wherein said microprocessor randomly generates a play message command associated with one of said second plurality of speed dial messages, and said message controller reproduces said one of said second plurality of speed dial messages in response to said play message command.

8. The toy telephone of claim 3 further comprising a program pushbutton switch connected as an input to said microprocessor and said microprocessor including a programmable memory, said microprocessor entering a program mode to store a subsequently entered sequence of keypad entries within a said memory when said program button is depressed in conjunction with another designated keypad pushbutton.

9. The toy telephone of claim 8 further comprising a record pushbutton switch connected as an input to said microprocessor, said microprocessor being configured to generate a record signal when said record pushbutton is depressed in conjunction with another designated keypad pushbutton, said message recorder being responsive to said record signal to record a subsequent voice message spoken into said microphone.

10. The toy telephone of claim 9 wherein said message recorder stores said recorded voice messages.

11. The toy telephone of claim 9 further comprising a play recorded message signal generated by said microprocessor, said play recorded message signal being generated upon said microprocessor receiving a keypad input sequence corresponding to said stored sequence of keypad entries, said message recorder being responsive to said play recorded message signal acting to reproduce said recorded message.

12. The toy telephone of claim 3 further comprising a plurality of stored keypad input sequences; a corresponding plurality of pre-recorded messages; and a plurality of unique play recorded message signals; said microprocessor generating a particular one of said plurality of unique play pre-recorded message signals in response to the keypad entry of a particular one of said plurality of stored keypad input sequences, whereby said voice controller, responsive to said particular one of said plurality of unique play pre-recorded message signals, reproduces the particular one of said pre-recorded messages corresponding to the particular one of said plurality of stored keypad input sequences entered.

13. The toy telephone of claim 12 further comprising a display whereon individual digits of said entered telephone number are displayed as the pushbuttons corresponding to said digits are pressed.

14. A method of teaching a child how to dial a telephone number comprising the steps of:

   providing a toy telephone including a handset, a base, a keypad, a programmable microprocessor configured to store a pre-determined telephone number, a microphone, a message recorder configured to store voice messages and a speaker;
   entering a telephone number into said programmable microprocessor;
   storing a voice message within said message recorder;
   allowing said child to enter numbers into said keypad;
   comparing the numbers entered into the keypad against the telephone number stored in said programmable microprocessor;
   playing the voice message stored in said message recorder when it has been determined that the numbers entered into the keypad match the telephone number stored in said programmable microprocessor.
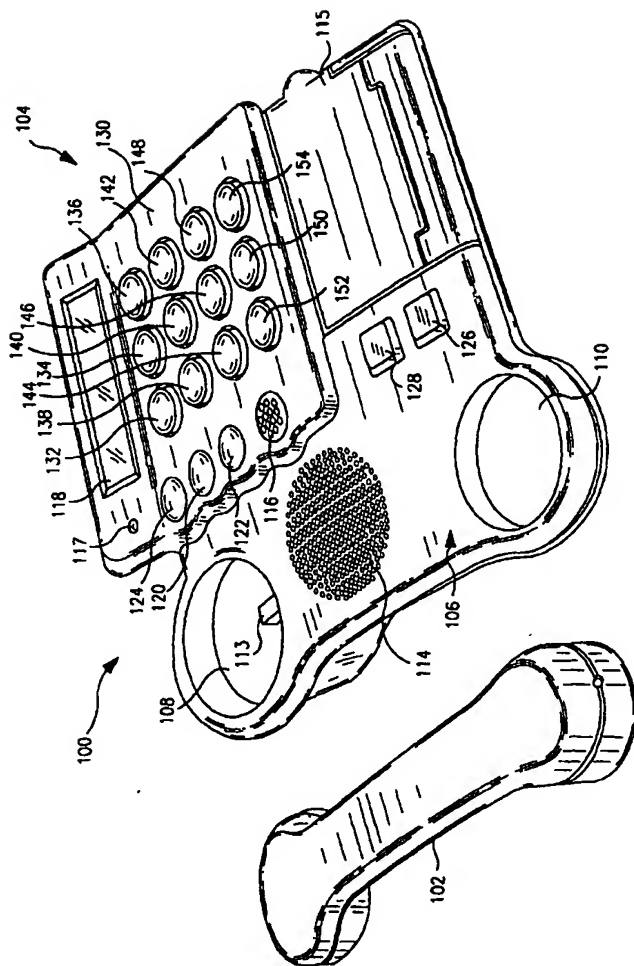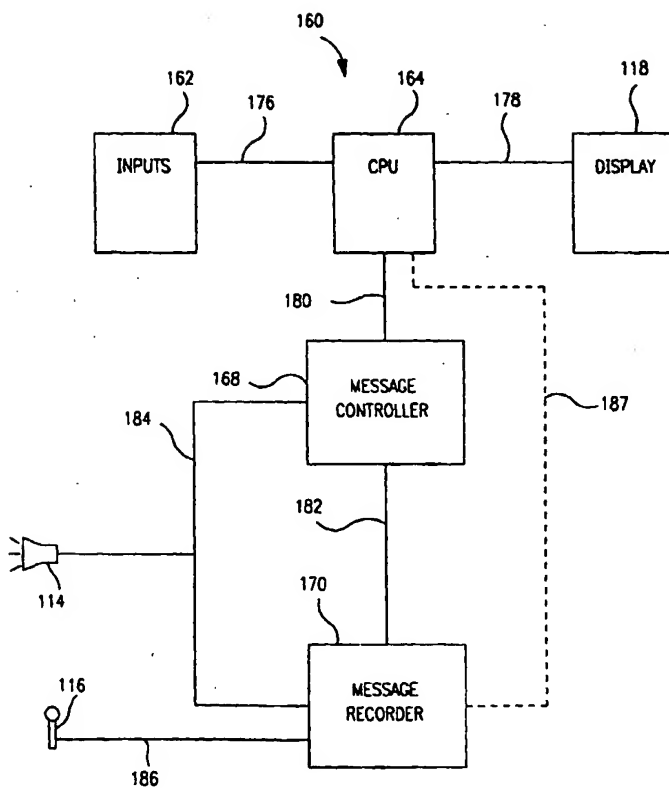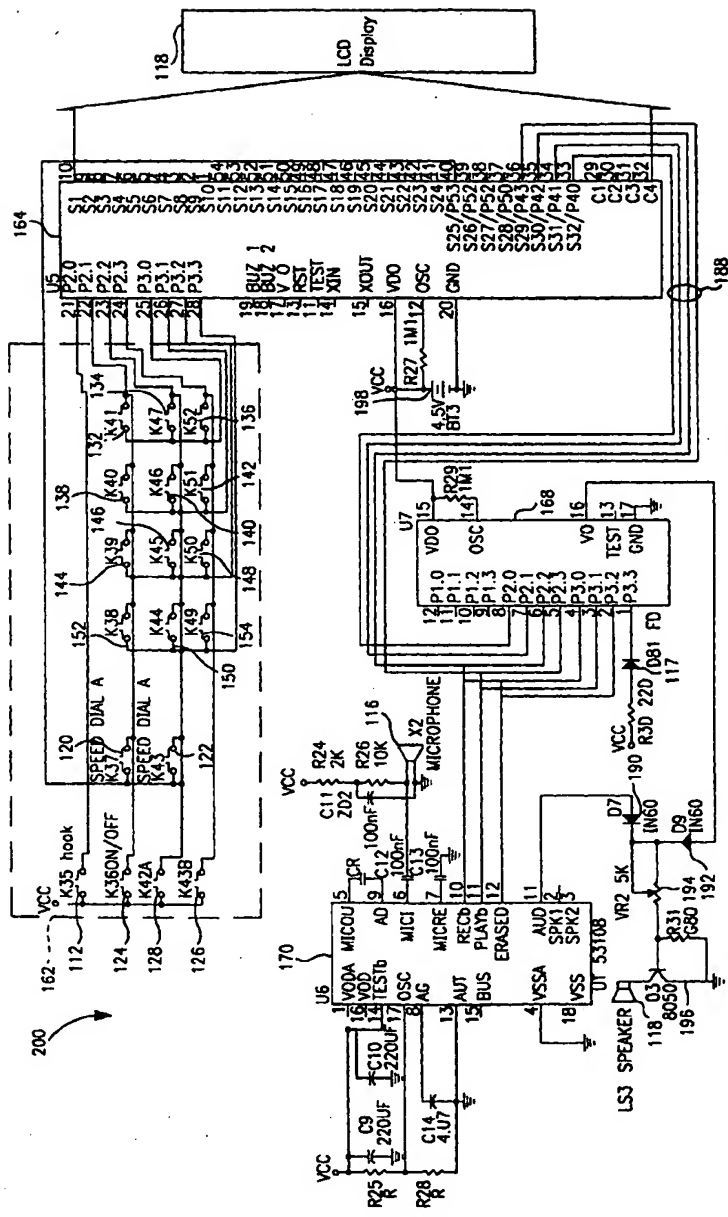
FIG. I

FIG. 2

FIG. 3

EUROPEAN SEARCH REPORT

European Patent Office

Application Number

EP 99 30 9255

	DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	US 5 420 915 A (GARRETT TIMOTHY E) 30 May 1995 (1995-05-30) * the whole document *	1,3-5,9, 11,12,14	G0989/00 A63H33/30
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Y	US 5 679 049 A (JEFFWAY JR ROBERT W ET AL) 21 October 1997 (1997-10-21) * column 2, line 33 - column 4, line 47; claims 1-3,7-14,22-24; figure 1 *	1,3-5,9, 11,12,14	
A		2,10	
A	US 5 456 605 A (PEKOL EDWARD A ET AL) 10 October 1995 (1995-10-10) * the whole document *	1,3-5,8, 12,14	
A	US 5 184 971 A (WILLIAMS SUSAN A) 9 February 1993 (1993-02-09) * column 3, line 20 - column 4, line 58; claims 1-7,13,15; figures 1,2 *	1-5,8-10	
A	US 5 513 993 A (BOSS GERALD R ET AL) 7 May 1996 (1996-05-07) * the whole document *	1-3,8, 12,14	TECHNICAL FIELDS SEARCHED (Int.Cl.7) G09B A63H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 February 2000	Gorun, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 99 30 9255

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82